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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/632,292	07/31/2003	Renato Keshet	100202652-1	5069

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EXAMINER	
PATEL, KANJIBHAI B	

ART UNIT	PAPER NUMBER
2624	

DATE MAILED: 11/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/632,292	KESHET ET AL.	
	Examiner	Art Unit	
	Kanji Patel	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 July 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,8-11,13,14,16-18,20,22,23,26,27,29 and 30* is/are rejected.

7)☒ Claim(s) *7,12,15,19,21,24-25,28 and 31* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *31 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *7/31/03, 9/29/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. Information Disclosure Statement submitted on 7/31/03 and 9/29/03 have been considered by the examiner.

Drawings

2. Drawings filed 7/31/03 have been approved by the examiner.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-6, 8-11, 13-14, 16-18, 20, 22-23, 26-27 and 29-30 are rejected under 35 U.S.C. 102(e) as being anticipated by Kokarala et al. (US 7,088,392 B2).

For claim 1, Kakarala et al. disclose a digital image processing method (Figures 1-3) comprising:

providing digital image data of a plurality of colors of an image (column 4 line 57 to column 5 line 10), wherein the image data comprises a plurality of sets individually comprising mosaic data of one of a plurality of colors at a plurality of

pixel locations (in Figure 2, 25a, 25b, 25c provide mosaic data; see also column 1, lines 20-35);

analyzing image data of one of the pixel locations with respect to image data of another of the pixel locations (Figures 2-3, 6B, 7; column 15, lines 15-61; pixel location of G2 in a Bayer pattern is analyzed using another surrounded pixel locations such as G1 values; a 3x3 filter in equation 19 is used for analyzing smoothing filter; similarly Figure 7 provides sharpening operation); and

adjusting the image data of the one pixel location responsive to the analyzing, wherein the adjusting comprises adjusting to one of denoise (column 15 line 15- 61) the image data and sharpen (column 15 line 62 to column 16 line 46) the image data.

For claim 2, Kakarala et al. disclose the method of claim 1 wherein the analyzing comprises analyzing image data of the one pixel location with respect to image data of a plurality of other pixel locations (column 15, lines 15-61; pixel location of G2 in a Bayer pattern is analyzed using another surrounded pixel locations such as G1 values; a 3x3 filter in equation 19 is used for analyzing smoothing filter; similarly Figure 7 provides sharpening operation).

For claim 3, Kakarala et al. disclose the method of claim 2 wherein the adjusting comprises adjusting to sharpen (column 15 line 62 to column 16 line 46) the image data of the one pixel location responsive to the analysis of the image data of the one pixel location with respect to image data of one of the other pixel locations and to denoise (column 15 line 15-61) the image data of the

one pixel location responsive to the analysis of the image data of the one pixel location with respect to image data of another of the other pixel locations.

For claim 4, Kakarala et al. disclose the method of claim 1 wherein the analyzing comprises comparing (step 670 in Figure 6B) the image data of the one pixel location with image data of the pixel location.

For claim 5, Kakarala et al. disclose the method of claim 4 wherein the adjusting comprises adjusting to denoise (Figure 6B; step 690) the image data responsive to the comparing (step 670) determining a difference of the image data of the one and the another pixel locations to be a within a first set of values and adjusting to sharpen (Figure 7) the image data responsive to the comparing (step 710) determining the difference of the image data to be within a second set of values.

For claim 6, Kakarala et al. disclose the method of claim 4 wherein the adjusting comprises adjusting to denoise (Figure 6B; step 690) the image data responsive to the comparing (step 670) determining a difference of the image data of the one and the another pixel locations to be within a first set of values and adjusting to sharpen (Figure 7) the image data responsive to the comparing (step 710) determining the difference of the image data to be within a second set of values different than the first set of values.

For claim 8, Kakarala et al. disclose the method of claim 4 wherein the adjusting comprises adjusting to denoise (Figure 6B) the image data responsive to the comparing (step 670) determining a difference of the image data of the one and the another pixel locations to be less than a threshold (step 670) and

adjusting to sharpen (Figure 7) the image data responsive to the comparing (step 710) determining the difference of the image data to be greater than the threshold.

For claim 9, Kakarala et al. disclose the method of claim 8 wherein the adjusting to sharpen (Figure 7) the image data comprises adjusting responsive to the comparing (step 710) determining a difference of the image data is less than another threshold (step 810).

For claim 10, Kakarala et al. disclose the method of claim 9 wherein at least one of the thresholds comprises a single value (column 15, lines 25-27).

For claim 11, Kakarala et al. disclose the method of claim 9 wherein at least one of the thresholds comprises a transition period of a plurality of values (column 12, lines 10-27).

For claim 13, Kakarala et al, disclose the method of claim 1 wherein the sets individually comprise image data of no more than a single color (25a or 25b or 25c).

For claim 14, Kakarala et al. disclose the method of claim 1 wherein the adjusting comprises adjusting utilizing a robust estimation filter (a combination of a smoothing operation provided in Figures 6B and a sharpening operation provided in Figure 7 corresponds to a robust estimation filter).

For claim 16, Kakarala et al. disclose the method of claim 1 further comprising demosaicing (Figures 2-3) the sets of the image data after the adjusting to provide composite image data capable of being utilized to provide a representation of the image.

For claim 17, Kakarala et al. disclose the method of claim 16 wherein the composite image data comprises data of more than one of the colors at individual ones of the pixel locations (column 5, lines 1-10; Figure 2-3).

For claim 18, Kakarala et al. disclose a digital image processing (Figures 1-3) method comprising:

providing digital image data of a plurality of colors of an image (column 4 line 57 to column 5 line 10), wherein the image data comprises a plurality of sets individually comprising mosaic data (in Figure 2, 25a, 25b, 25c provide mosaic data; see also column 1, lines 20-35) of one of a plurality of colors at a plurality of pixel locations;

filtering the mosaic data of the respective sets using a robust estimation filter (column 15 line 15 to column 16 line 46; a combination of a smoothing operation provided in Figures 6B and a sharpening operation provided in Figure 7 corresponds to a robust estimation filter); and

demosaicing (Figures 2-3; demosaicing algorithm is described in details by using Figures 2-3) the mosaic data of the respective sets after the filtering to provide composite image data capable of being utilized to provide a representation of the image.

For claim 20, Kakarala et al. disclose the method of claim 18 wherein the filtering comprises denoising (Figure 6B) the mosaic data responsive to determining a difference of mosaic data of one and another pixel locations being less than a threshold and sharpening (Figure 7) the mosaic data responsive to determining the difference of the mosaic data being greater than the threshold.

For claim 22, Kakarala et al. disclose an imaging system (Figure 1; column 4, lines 46-56) configured to provide digital image data of a plurality of colors of an image (column 4 line 57 to column 5 line 10), wherein the image data comprises a plurality of sets individually comprising mosaic data (in Figure 2, 25a, 25b, 25c provide mosaic data; see also column 1, lines 20-35) of one of a plurality of colors at a plurality of pixel locations; and

processing circuitry (in Figure 1, digital signal processor 40 provides a processing circuitry; also Figures 2-3 provide a detailed demosaicing algorithm) coupled with the imaging system and configured to access the mosaic data (raw data 25 in Figure 1 and 25a-25c in Figure 2) of the plurality of sets, to sharpen at least some of the mosaic data of the sets, and to demosaic the mosaic data after the sharpening (column 15 line 62 to column 16 line 46) to provide composite image data capable of being utilized to provide a representation of the image.

For claim 23, Kakarala et al. disclose the device of claim 22 wherein the processing circuitry is configured to sharpen (column 15 line 62 to column 16 line 46) at least some of the mosaic data using a robust estimation filter (a combination of a smoothing operation provided in Figures 6B and a sharpening operation provided in Figure 7 corresponds to a robust estimation filter).

For claim 26, Kakarala et al. disclose the device of claim 22 wherein the processing circuitry comprises processing circuitry of a digital camera (column 4, lines 46-53).

For claim 27, Kakarala et al. disclose an article of manufacture comprising:

a processor-usable medium comprising processor-usable code configured to cause processing circuitry to (Figure 1):

access digital image data of a plurality of colors of an image (column 4 line 57 to column 5 line 10), wherein the image data comprises a plurality of sets individually comprising mosaic data of one of a plurality of colors at a plurality of pixel locations (in Figure 2, 25a, 25b, 25c provide mosaic data; see also column 1, lines 20-35);

apply a robust estimation filter to the mosaic data of the respective ones of the sets ((a combination of a smoothing operation provided in Figures 6B and a sharpening operation provided in Figure 7 corresponds to a robust estimation filter)); and

combine the filtered mosaic data to provide composite image data capable of being utilized to provide a representation of the image (Figures 6B, 7; column 15 line 15 to column 16 line 47).

For claim 29, Kakarala et al. disclose the article of claim 27 wherein the processor-usable code is configured to cause the processing circuitry to apply the robust estimation filter to denoise (column 15, lines 15-61) and to sharpen (column 15 line 62 to column 16 line 46) the mosaic data in a common processing step.

For claim 30, Kakarala et al. disclose the article of claim 27 wherein the processor-usable code is configured to cause the processing circuitry to denoise (Figure 6B) the mosaic data responsive to a determination of a difference (step 330 in Figure 3) of the mosaic data of one and another of the pixel locations

being than a threshold and to sharpen (Figure 7) the mosaic data responsive to a determination of the difference of the mosaic data being greater than a threshold.

Allowable Subject Matter

4. **Claims 7, 12, 15, 21, 24-25, 28 and 31** objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Prior art fails to teach or fairly suggest, singly or in combination, a robust estimation filter comprising a bilateral filter without division operations as stipulated in claims 15, 19, 24 and 28.

Prior art fails to teach or fairly suggest, singly or in combination, applying square root operations to the image data of the one pixel location and the image data of the other pixel location before the adjusting as stipulated in claims 7, 25 and 31.

Prior art fails to teach or fairly suggest, singly or in combination, addressing a look-up table responsive to the comparing, and adjusting using values obtained from the look-up table responsive to the addressing and configured to implement the denoising for results of the comparing determining the difference is less than the threshold and to implement the sharpening for results of the comparing determining the difference is greater than the threshold as recited in claim 12.

Other prior art cited

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Jaspers (US 7,081,919) discloses a green reconstruction for image sensors.

Kakarala (US 7,015,961 B2) discloses a digital image system and method for combining demosaicing and bad pixel correction.

Jones (US 6,924,841 B2) discloses a system and method for capturing color images that extends the dynamic range of an image sensor using first and second groups of pixels.

Hel-or et al. (US 6,404,918 B1) disclose an image demosaicing method utilizing directional smoothing.

Maurer et al. (US 6,731,821 B1) disclose a method for enhancing compressibility and visual quality of scanned document images.

Berkner (US 7,068,851 B1) discloses a multiscale sharpening and smoothing with wavelets.

Maurer (US 6,665,448 B1) discloses a selective smoothing and sharpening of images by generalized unsharp masking.

Hunter et al. (US 7,071,978 B2) disclose an image mosaic data reconstruction.

Olding et al. (US 6,970,597 B1) disclose a method of defining coefficients for use in interpolating pixel values.

Contact Information

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kanji Patel whose telephone number is (571) 272-7454. The examiner can normally be reached on Monday to Friday from 7:30 a.m. to 5:00 p.m. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bella, Matthew can be reached on (571) 272-7778. The fax phone number for the organization where this application or proceeding is assigned is (571)-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Kanji Patel
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11/10/06

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